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ABSTRACT

The purpose of this paper is to assist school district decision makers in formation of computer policy by: (1) developing a framework for analyzing the policy making process; (2) reviewing national and local policies on computer use; (3) analyzing current practice as de facto policy; and (4) evaluating the effects of written and/or de facto policy. Part I of this document describes the policy making process generally, and offers some specific ways that various groups approach policy developing. Part II presents some characteristics of computer use in schools and reviews policies that have been established by other districts. Part III describes a model for analyzing current computer use in schools, and discusses how this model can help a school board in understanding de facto policy in their districts. The summary and recommendations list a number of characteristics of school computer use including utilization of computers without any stated policy; unequal distribution of computer resources due to economic differences; and initiation of computer acquisition by individuals, which complicates policy making. The conclusion calls for the adoption of a standard analytical tool--the distributional matrix--so that districts can compare their patterns of computer use. A list of references completes the document. (JB)

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No. 108 ANALYSIS OF MICROCOMPUTER POLICY

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PREFACE

The Research on Evaluation Program is a Northwest Regional Educational Laboratory project of research, development, testing, and training designed to create new evaluation methodologies for use in education. This document is one of a series of papers and reports produced by program staff, visiting scholars, adjunct scholars, and project collaborators--all members of a cooperative network of colleagues working on the development of new methodologies.

What are the elements of school district policy on computer use? How can districts in the midst of rapidly expanding computer resources quickly develop their own local policies? This report presents a preliminary procedure for inferring de facto computer policy by studying current computer practice in terms of freedom of use, access, and equity. Based on subsequent field trials, this procedure will be adapted for local district use in forming computer policy.

Nick L. Smith, Editor
Paper and Report Series

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ABSTRACT

School board members and superintendents face a wide and increasingly complex range of decisions concerning policies for the use of computers in school districts. Most school districts are faced with the proliferation of computers in the classrooms, but they have few policies on the use of computers. This paper is the first part of a three-phase study on the formation and impact of computer policy. The scope of issues includes both administrative and instructional uses of computers. In addition, other issues such as access, equity, financing, curriculum, and control will be addressed at the policy level. Development of policy on computers is critical and this paper develops a useful framework which can be applied to the premise that practice represents defacto policy. A systematic inquiry based on a distributional model is suggested as a helpful tool in analyzing the current status of school computer use. The emphasis of the second phase of this study will be on the application of the distributional matrix, and the third phase will report on the utility of this tool as a decision support resource for, superintendents and school board members.

ANALYSIS OF MICROCOMPUTER POLICY

Typically, school districts develop written policies in a variety of areas such as student discipline, personnel, energy conservation, testing, etc. In some circumstances, policy has been developed slowly as the district's circumstances necessitate. In other cases, policy has been formed by crisis management.

Because of the widespread and near frantic acquisition of computers in schools, most districts find their schools are using computers before a policy has been developed. A 1984 survey of 1,000 randomly selected school districts reported that 86 percent of the districts have no policy or guidelines concerning computer-assisted instruction or computer literacy classes (National School Board Association, 1984).

The purpose of this paper is to assist decision makers in formation of computer policy by (1) developing a framework for analyzing policy making process, (2) reviewing national and local policies on computer use, (3) analyzing current practice as defacto policy, and (4) evaluating the effects of written and/or defacto policy.

Part I of this document describes the policy making process generally, and offers some specific ways that various groups approach policy developing. Part II presents some characteristics of computer use in schools and reviews policies that have been established by other districts. Part III describes a model for analyzing current computer use in schools, and discusses how this model can help a school board in understanding de facto policy in their districts. Determining de facto policy sheds light on some of the predominate values that affect decisions and allows board members a reasonably comprehensive picture.

I. Understanding Policy and Policy Formation

A policy statement provides boundaries within which an educational program can operate. A policy statement is a means through which the board directs the resources of its district. Policies give directions and indicate those school activities which the board supports.

> Local boards of education should develop discrete and definitive policy about policy. To begin, we need to consider policy which legitimizes the need to examine the structure and processes of policy making. Among the standard features of a preferable policy-making method, the foremost is the clarification of values, objectives, and criteria for decision making.
>
> (Cunningham, 1980, p. 54)

Policy making is not always a logical, problem-solving or decision-making process. Policy making may be simple or complex. Due to the range of issues, setting policy for computer use will be a complex task.

Policy makers must mediate among various sets of beliefs, needs, and lifestyles, and at the same time judge what is possible as well as what is preferable (Wolfe, 1982).

Rather than a scientific process, the selection of one policy alternative rather than another is a social process with all the virtues and impediments which characterize social activities. To be sure, there are some standardized activities, such as collecting information, reviewing alternatives, and insuring successful implementation, that often accompany policy development. On basic issues, this process is effective. However, when the issues are more complex and difficult, the process becomes one of negotiation. Policy makers must weigh the importance of various factors and choose those that will lead to the desired outcome.

Policy statements are a reflection of the beliefs, assumptions, and needs of the policy makers, and are rooted in the philosophical, social, economic, and political realities of the times. Therefore, this paper assumes that values, pressures,

and merit all converge on the policy formulation process. This will be especially true for determining policy on computer use on the complex and rapidly changing role of computers in schools.

While many like to characterize policy making decisions in our society as objective and logical, for many reasons policy making processes do not fit this description. The following section discusses some of the reasons why policy making encompasses non-logical functions and why it is important to recognize these factors when initiating new written policy.

A. Barriers to Objective Policy Building

1. Conflicting values. In a given community, many share values, beliefs and ideologies, but there may be significant differences on some matters, and especially on which values take priority. Maximizing any one value will reduce another. A policy problem results when all these values are accepted, and yet all of them cannot be implemented equally. Frequently, there is an inherent tension among priorities. Green provides an example of the conflict between multiple values in education.

> Policy issues are always "nested" within a set of mutually incompatible values or goods. We seek (1) equal educational opportunity for children, (2) an equitable distribution of the tax burden, (3) local control of education, (4) responsible management of the state budget. Maximizing any one of these--that is, getting as much of it as we can--will damage the advancement of the others.
>
> (Green, 1982, p. 144)

On difficult issues, policy makers can expect to encounter disagreement over assignment of priorities. Policies very often deal with the allocation of scarce resources. Since individuals and groups frequently disagree on the distribution and use of resources, tension and litigation accompany the policy formation process. Only in paradise can one imagine that all goods are simultaneously in sufficient supply so there is no conflict in their allocation (Green, 1982). But all desires cannot be provided simultaneously in sufficient supply and by securing

some, we are unable to secure some others. Dolbeare writes, "If we successed in providing as much equality as is wanted, we are unlikely to have as much liberty as is wanted" (Dolbeare, 1982, p. 9).

2. Incomplete information. Another feature of policy deliberation is incomplete information. The idealized "rational" decision making process in which objective facts are presented and choices are made on merit is almost unknown in most policy discussions. The selection of what is measured is a "fact," the choice of analytical techniques, and the style of presentation, is shaped by values and beliefs.

That is not to say there is no reliable information. Soundly assessed and accurately communicated current information can be an important guide for the decision maker. The point is that, from the very beginning, policy questions are shaped by a selective information gathering process and skewed by values and perception of the researcher and presenter.

3. Changing needs over time. The focus of any policy question may change over time. There is no way to accurately predict the future, so policy makers must try not to be too specific or too general. It should be expected that policies will change and will reflect temporal issues. Policies must keep pace with the growing complexity of individual and organizational life, and respond to educational needs generated out of change.

B. Ways of Approaching Policy Making

Policy may be set by a variety of methods. Some claim that this is a political process; others characterize it as a social process (Wolfe, 1982). This section presents three definitions of policy making activities. The purpose of this presentation is to offer an explicit outline of the steps and components of public policy deliberations. A number of strategies have been proposed but little effort has been put forth on a summary. This section summarizes three major strategies.

1. Systems model. A systems model paradigm for policy analysis has been advocated by Gray (Gray, 1984). It is characterized by a cyclical process: (1) problem emerges, (2) policy analysis conducted, (3) alternatives presented, (4) draft one option, (5) public review, (6) decision to adopt implementation, (7) evaluation of impact, (8) from which a new problem may emerge or a need for revision becomes evident. Gray suggests that the steps in policy analyses are similar to those attendant to research projects, or any structured planning process.

1. Problem clarification,
2. Question development,
3. Data collection, analysis,
4. Identification of implications.

(Gray, 1984)

The goal of this process is to facilitate "the choice of the best policy among a set of alternatives with the aid of reason and evidence" (MacRae, 1979).

2. Intuitive-experiential model. There is another approach less logical, but possibly more accurate because it has less pretense of being a rational method.

House (1982) proposes that policy making is an art not a rational process. Since goals are not articulated, boundary conditions unspecified, and trade-offs not accurately described, policy analysis must depend on the skills of humans--particularly on their intuition and experience.

This model proposes that the possibilities for resolution of an issue depend on qualitative factors rather than on quantitative techniques. Often the policy questions rise from an illogical base; they may not "make sense." The driving force for a particular issue seldom comes from a scientific or technical sphere. Usually, there has been an alteration in the relative distribution of power or allocation of resources--a situation which is not always fully rational and empirical. Additionally, policy makers are constrained by limited time, few resources, and the impossibility of identifying all of the options. So

"practical experience and common sense are the basics in the art of policymaking . . . The neatly reasoned and structured process portrayed in textbooks does not exist at times of stress" (House, 1982, p. 163).

3. Balanced model. A third approach to the definition of policy making behavior is offered by Green (1982). His model distinguishes four discrete functions in policy considerations: policy analysis, policy formation, policy decision, and political analysis. These distinctions are useful because they allow a categorization of specific functions of the policy making process and analyze their purposes.

These activities may not occur in a set sequence as suggested by the system's model. In other words, this approach is not as deterministic as the first model, nor as idiosyncratic and arbitrary as the second.

Conceptually, it is more trying because it is a "four-ring" circus rather than a logical sequence or a leap of faith. Still, the model is a useful one as it legitimizes the conduct of public policy deliberations in terms of evident activities.

Four factors of this balanced model are derived from Green's chapter.

Policy analysis, according to Green, is a rational activity of "assessment of net marginal gains. Which set of values will be advanced, which will not, and with what net benefits?" The key issue in policy analysis is the resolution of incommensurate positions. "How do we determinine which among the competing values is to be given the greatest weight?"

Policy analysis is based on the theory of marginal utilities—an analysis of trade-offs, but is not a political process. "A truly refined policy, which rarely exists, would tell us the net benefits. But no such analysis, no matter how refined, will tell us whether it is worth it. In order to resolve that question . . . we need a political analysis and a political decision" (Green, 1982, p. 151).

Policy formation is quite a different process. It is based on the theory of rhetoric, i.e., what form the policy will take. This process is imbued with personality styles, "persuasion, arguments, and (seemingly) endless meetings with those who actually pen (the document)." This activity is similar to the role of intuition and experience of the second model mentioned above. Once a balanced policy choice or range of choices has been formulated and written, a decision or line of action is usually assigned.

Policy decision is characterized by an authoritative action such as a vote by a school board subcommittee. Although many groups are charged with making a policy decision, this obligation often is not fulfilledd and the policy formulation process continues with no decision made. A good illustration of this process is described by Gray and Rawers in their analysis of one district's computer use planning. They describe the district's attempt to develop computer policy as frustrating, incomplete, and misdirected. They conclude, "After six months a new committee has been formed to essentially repeat the work of the old committee" (Gray and Rawers, 1984, p. v).

In this case study there was no political analysis. The activity of weighing political feasibility was never approached. It appears that there was neither a product nor a constituency for the political process. Political analysis is concerned with praticality--can it be done? "In short, the exercise of political judgment is a practical activity and the results of this activity may differ from and even contradict the results of policy analysis" (Green, 1982, p. 153).

When we view all these activities together, there exists a certain balance--one that includes (1) rational standards as evidenced by policy analysis activity, (2) practicality noted in political analysis, and (3) speculative behavior of policy formulation. In summary, policy formation behaviors include both rational and intuitive elements as well as quantitative and qualitative measures.

This paper suggests that the decision maker can participate and contribute to all activities representative of policy development. By using a variety of strategies, policy makers are better equipped to handle the complexities and consequences of policy making. Certainly this is a larger task, but in doing so they may achieve the laudable goals of equity and excellence. The next section offers a framework for analyzing school computer use policy, because no matter which activity a policy maker chooses, they need a substantive review of the current situation.

The final sections of this document will explain a specific model on which to base policy decisions concerning computer use. The reader is encouraged to review these sections in light of the models and activities discussed above.

II: Computer Use and Policy

A. The Problem: Influence of Values

One of the major innovations in education has been the use of the microcomputer. As more and more districts acquire microcomputers, pressure will mount for a policy which defines, among other things, distribution, control, and access. Policy options address established areas such as curriculum, staffing, financing, and new areas such as standards for computer literacy, for student teachers, and administrators. Another important area is the coordination of school based computing activities to those at home.

All of these issues will require some guidelines. Values held by school board members will certainly influence the outcome. At this point, board members faced with policy making responsibilities should be aware of which values will affect their decision-making and consider a process acknowledging the importance of these values and at the same time striving for some objectivity.

Educational research indicates that influential values affecting educational policy are (1) freedom, (2) access, and (3) equity (Hawley and Hill, 1976). Table 1 summarizes these three values and their relation on a continuum.

Table 1

Polar Positions on Value Continuum

1.	Freedom	
	little control	high control
	decentralized purchase and use	centralized purchase and use
2.	Access	
	open	restricted
	equality of opportunity	specialized opportunity
3.	Equity	
	equality of conditions	equality of opportunity

There are several ways one might go about developing a policy which considers the three values listed in Table 1. For example, suppose we support the definition of equity as equality of opportunity. This value is represented by individualism, i.e., that each individual is responsible for his or her relative success or failure. It is assumed that each individual has approximately the same opportunity, and later accomplishments must be due to the effort put forth. This view then supports the opportunistic use of computers rather than requiring that all students have computer experience. An example of selected computer experience is when computer experience is allowed only for students participating in certain classes.

Green suggests that policy deliberation should ask "What is the net marginal gain? A truly refined policy analysis, which rarely exists, would tell us how much we are likely to gain in the advancement in one area for a corresponding cost in another Green, 1982, p. 152)." But this is very difficult even when addressing a complex policy such as one on computer use.

Some schools have had minimal experience with computers, while other, generally larger schools, have been familiar with computer technology for some time. As early as 1975, some schools were providing classes on computer programming. This attracted a small band of devotees. This specialized activity was largely ignored by the general student body and faculty.

By 1980, the advent of low-cost microcomputer systems, combined with the growing importance of computers in employment, convinced parents, faculty, and students that classes in computer programming were too narrow and that knowledge about computers should reach all students. Different interest groups have spoken for: (1) required classes on introduction to computers, (2) required sections within science classes, (3) required sections within math classes, and (4) requiring all seniors to have one quarter credit, etc.

Currently, many schools have added required classes and most of them all offer computer experience, both of computer assisted instruction and computer programming. Yet, consistently, there has been a parochial perspective associated with the introduction of computers. One of the major findings in research on computer use has been the need for integration of these diverse and fragmented groups into a system-wide perspective (Rockman, White, Rampy, 1983).

Administrators want to know if they can decide independently on acquisitions. Teachers await official policy. Board members must delineate policy from guidelines from procedures. All this is to be done on a system that is functioning with "stakeholders" at every level.

Some districts are responding to this issue by (1) increasing their budgets for computer materials, (2) integrating instructional materials--traditional as well as computerized, (3) developing criteria for evaluating hardware and software, and (4) developing a good understanding of the cost, benefits, and risks of purchasing computer materials. Certainly this is not an exhaustive description, but it illustrates the developmental sequences and issues germane to computer use policy.

An educationally acceptable policy on computer use must be fair, efficient, and reflective of the needs of the school district. Generally, educators have found that computers enhance the educational experience and administrators value computers for managerial services. Descriptive evidence and good communication can provide some guidance when policy is not available. Sheingold, Kane and Endreweit (1983) conclude "the results suggest that the effects of microcomputers on education will depend, to a large extent, on the social and educational contexts within which they are imbedded" (p. 431). By applying an analytical model, one can begin to examine how computers are being used in schools. This framework will be helpful as a decision support mechanism for educators both at state and local levels. Before presenting the model, the common areas of computer use will be defined.

B. Common Denominators of Computer Use: Considerations for Policy Makers

As noted earlier, awareness of values is critical to our understanding of policy. Often clarification of these values with respect to actual use is difficult. Policy makers are generally reluctant to investigate the competition for resources because it is difficult to clarify the purposes compared to the implementation.

> Educational agencies at local, regional, and state levels are making decisions daily about the uses of computers in schools. Most are making the decisions by inaction; they let events in which they do not actively participate determine how students and teachers acquire computers and computer experiences.
>
> (Rampy, White, Rockman, 1983).

Before presenting some examples of national policy on computers, a basic definition of computer use is needed. Table 2 (from Gray, 1984, p. 14) details the levels and tasks generally considered to represent school-based computer use.

Table 2

Computer Use Areas and Topics

Instructional Use

Computer assisted instruction using software for drill and practice, tutorial, simulation, and examination

Problem solving in content areas using software for word processing, data base management, spreadsheet applications, graphics, programming, and educational games

Computer literacy/computer science

Administrative and Support Service Use

Local use (confined to individual buildings or departments) and
District-wide management information use (which assumes the sharing of data across site and potentially with external agencies); specific local and district-wide uses may fall under topics like:

- Student records: enrollment, daily/period attendance, immunization, scheduling, grades and process reporting, test scoring

- Office applications: report writing and other word processing, calendar scheduling, student activity accounting, inventory

- Special support uses: print shop ordering, curriculum materials center booking, personnel grievance data, teacher/substitute information, financial forecasting, maintenance, work order record keeping, transportation routing, on-line cash registers, enrollment projections

- Training--teachers, administrators and parents--community based strategy based on public library model

School boards throughout the nation are aware of the rapid computerization of their districts. Decision makers can no longer remain observers of this situation. Unfortunately, there is a lot of catching up to do. Rampy, White, and Rockman (1983) have identified 21 critical issues in computer policy. These issues form the basis of assessing current conditions. Of course, how all this is manifested will vary from district to district. Examples of national and local policies on the use of computers provides some generic guidance and acknowledges the concerns of specific areas.

C. Examples of Policy

Most school boards have not adopted any official policies specifying the role of computers in instruction either as a tool or as subject matter. The National School Board Association has collected policies on computer education and computer assisted instruction from different districts. To date, they have not published policies on the administrative use of computers. Examples of policy on computer education and computer assisted instruction are on the next two pages.

1. Computer Education

In the case of computer education, the National School Board Association has issued the policy of the Fitzgerald Public Schools, Warren, Michigan:

1. Computer literacy for all students.
   a. Understanding what computers are and how they evolved.
   b. Appreciation of the capabilities and limitations of computers.
   c. Knowledge about careers that are directly or indirectly computer-related.
   d. Awareness of the implications of the computer to society.
   e. Develop programs so that handicapped students can have access and be free from limitations based on ethnic racial background.
2. Computer literacy for all certificated staff members appropriate to their assignment.
3. A districtwide coordinated computer education program that provides skill development in the use of computers as instructional tools and prepares students for computer-related vocations or advanced training.
4. A staff that has the ability to provide appropriate computer education at all instructional levels.

2. Computer Assisted Instruction

On the topic of computer assisted instruction, the policy of North Sacramento Elementary School District is considerd a useful national example:

> Provide all K-6 grade pupils with appropriate instructon in computer literacy and computer-assisted instruction through the establishment and use of computer learning centers in each school as funds are made available;
>
> Provide all instructional personnel with appropriate inservice in computer literacy;
>
> Develop instructional objectives for pupils participating in computer literacy and computer-assisted instruction that will assist them in reaching educational goals approved by the Board;
>
> Provide funding for the computer learning centers through special state or federal sources; grants or other funding obtained through the Sacramento County Foundation for Quality Eduction; donations from computer manufacturers; donations from community groups or individuals; and through allocation of district funds.
>
> To extent possible computer assisted instruction shall be "barrier free."

Another key policy question concerns the need for teacher training.

> The problem facing the school district and its governing board is two-fold; first is the student demand for the opportunicy to learn about computers and second is the demand by teachers to acquire a level of computer literacy to be able to systematically integrate the computer into the public school curriculum.
>
> (Enloe & Metzelaar, 1983)

A recent review of curriculum of four state university schools of education reveal that there are few opportunities or required competencies in the area of computer use (Young, 1983). The burden then falls on (1) individual teachers for continuing education, (2) school districts for inservice training.

We begin to recognize the circularity of the problem--schools of education have not delineated competencies--teachers do not have the knowledge or skills to teach the topic--parents and students request the subject matter--administrators respond incrementally--school boards deliberate on policy which depends on the philosophy and objectives yet to be clarified by schools of education and the educational community.

National policies reflect concern for access and equity but say little about control. On the other hand, local policies seem to be concerned with control and teacher-related issues. Because of the complexity of the current situation, many school boards feel unable to relate to the range of issues.

Recent findings reveal marked descrepancies between the number of computers in schools attended by low income (poverty level) children compared to schools attended by higher socioeconomic status (SES) households. "Poverty level children are falling rapidly behind in computer access and the chasm between the privileged and underprivileged is likely to grow wider" (Komoski, 1983, p. 1).

In order to address these issues, many school districts are adopting a new form, a staff position of "Computer Coordinator." This position or office usually has the responsibility of developing, budgeting, managing, and evaluating computer use and coordinating computer use in the district. This solution has

been well received. But there continues to be questions in the areas of access and equity. Despite national support for access and equity, surveys report severe lack of equity and major differential characteristics in access. Affluent communities have significantly greater opportunities for computer education, and boys consistently have more access to computers than do girls. Policies need to be revised to respond to the inconsistencies between district intent and practices.

Local Examples

Within the Pacific Northwest, several large school districts have developed policies about computer use. The following chart summarizes them:

1. Management and Coordination
   - development of computer coordinator office
   - coordination office has advisory committee
   - budget all computer related expenditure
   - set hardware standards-compatibility with input/representation from all sections
   - set software standards to curriculum needs
   - develop maintenance and security plan

2. Instruction
   - equipment and programs that logically relate to curriculum
   - will have K-12 computer studies curriculum
   - establish a committee that reviews particular types of software
   - staff development--teachers competent in use of computer in instructional setting
   - inform parents of kinds of computers and types of software

3. Administration
   - coordinate system to provide management data
   - staff development--competent in administrative use of computer for their assigned responsibilities
   - budget development--evaluate contract services for data management
   - use of student trainees in administrative computing will be limited to . . .

4. General Issues
   - allowance for revision and integration with other policies, especially policy about public gifts
   - opportunity for parents to borrow equipment
   - training classes for parents

All the districts with policies claimed that they were still catching up to what is already happening. Board representatives said there is a need for more work on computer use policy. But one of the problems has been that, since impetus for change and innovation for adoption of computers has generally been provided by various teachers and administrators, the board has no systematic method for gathering data. Policy deliberations must include these early leaders as well as respond to the needs of the district as a whole. Since there may be some critical issue in "catching up," flexibility must be incorporated so adjustments can be made as needed.

In summary, local policies generally focus on issues of control and coordination. Local policies contain fewer statements indicating a concern for equity and access.

It is possible that, due to the idiosyncratic history of computer use in districts, most school boards just do not know whether students are receiving their fair share of computer experience. There remains, of course, many questions about district commitment and computer use. The next section develops an analytical method for generating information on computer use.

III. Practical Model for Analyzing Use and Defacto Policy

At this point, the reader is reminded that very few districts have policy on computer use. From a national survey, it is reported that 86 percent of the schools did not have policies on computer use (National School Board Association, 1984). The following method can assist a school board in their observations of current computer use. This paper suggests that, in lieu of written policy, actual practice represents current de facto policy.

A. Distributional Matrix

One method of evaluating the current status of computer use is by applying a method known as a distributional matrix. A distributional method for analyzing policy has been applied in many other settings, particularly public health and energy technologies. This method can be applied to the task of analyzing both explicit and implicit policy.

"Distribution" differs from the concept of access because it is the process that allows access. Information generated by distributional analysis will define (1) who uses computers, (2) for what purposes, and (3) under what circumstances. By applying a distributional framework, one may gain an understanding of the values that affect and are effected by current computer use. Though the content (specific uses) may vary from district to district, the process used to identify values can be the same in all locations. This is an initial model to be developed in the field research phase of this study.

Figure 1 presents a matrix, an exploratory tool, for analyzing distribution and values. This prototype is useful for describing both use and written policies.

School districts face the fact that decisions concerning computer use have been made without a stated policy. Isolated decisions have been ongoing, and these may not have been consistent with the school's overall policy of, for example, equal access. Schools often have taken a laissez-faire attitude about computer use. By observing computer use within these categories, certain patterns may emerge--a profile--of conditions and values. Of course, some actions may not be related to underlying values, but as a pattern there is sufficient consistency to support the inference.

B. Use of Matrix: How Distribution Can Reveal Values and Infer Policy

The matrix allows for categorization of a variety of issues by values. This is accomplished by rating the practice according to the categories zero, conditional, or open.

Figure 1
Computer Use

Values	Distribution Characteristics: Zero	Conditional	Open
Access			
who			
when			
purpose			
Equity			
women			
minorities			
low SES			
handicapped			
Control			
who			
where (centralized or decentralized)			
hardware			
software			
security			
maintenance			

For example, some districts allow computer access only in conditional circumstances, i.e., as part of a science class. Another school may have open and conditional access, i.e., unrestricted after school and in classes. Applying this matrix not only provides information but chronicles the allocation of values.

A good example is access by gender. Numerous statistics indicate that boys have greater access and more use of school computers. The educational journal Equal Play cites one Wisconsin High School that "solved" the problem of scarce hardware by announcing that computers were reserved for boys who needed them in "preparation for engineering careers."

Other schools recognizing the problem of unequal access have reserved computer time for girls only. One administrator said "they (girls) would never have equal access--either emotionally or physically if we had not mandated this arrangement." After this structuring, girls' participation in computer use increased significantly.

Joan Turg, director of Palo Alto's Computer Tutor Program, reports that the initial contact is critical: "For girls it was important to see a role model; when girls first walk into a room with computers, they need to see other girls doing well, feeling confident while using the computer." She continues, "Although boys and girls may participate in equal numbers in school programs, the after-school program was overwhelmingly male" (Van Gelder, 1985, p. 90).

Gender issues are influential, and to the extent that computers are defined as a male domain rather than a neutral tool, we are placing the burden of entry on girls and possibly limiting their career options. Applying the distributional matrix to this situation, one would note that "zero" access would be checked when girls (who) were concerned.

There are other ways in which practice is "at odds" with values. For example, in many schools access to computers is allowed only by class participation. This is particularly true in math and science classes which often have their own computers in the classroom as opposed to in a computer center. This situation would be represented by the conditional category on the matrix.

Another entry point is video games, and for many girls this holds no fascination, because girls not only dislike the violent formats but find the competitive behavior boring.

Some schools are initiating the use of computers in language arts and are finding girls to be more eager and more receptive than boys. Two training programs which help teachers to ensure equitable access are available: EQUAL ACCESS, Lawrence Hall of Science, University of California, Berkeley; Computer Equity Training, Women's Alliance, New York.

Observations by school personnel attest to the problem of equal access and equity. For reasons like these, using the distributional model as a framework for analysis of the current computer use will be a valuable asset to the committee charged with policy formulation. Decision makers should receive some

systematic analysis of current conditions and how these conditions imply policy before formulating explicit written policies.

But, finally, the educational system must be responsible to the fact that without written policy, practice represents policy. Recognizing this and instituting an inquiry process (using whatever method) is essential to the understanding of computer use, the distributional method is an excellent way to highlight some of the major issues in defacto policy.

IV. Summary and Recommendations

In summary, a number of characteristics of school computer use are as follows:

1. Computers have been used in many school districts for some time without a policy, so that policy makers find themselves playing "catch-up."

2. Research on computer use indicates that individual teachers or administrators initiated computer acquisition for specific purposes. This idiosyncratic history must be taken into account when developing general policy.

3. Technological innovations are often distributed like other goods in the U. S. society, and poor districts have to respond to this widening technological gap by developing various funding sources.

The current status of computer use in most districts follows a laisse-faire pattern, and the consequence has been that most districts do not know the effects of computer education.

By applying a standard analytical tool, the distributional matrix, districts can compare their patterns of computer use. Eventually a national level picture of computer use practices could be generated. This monitoring will provide a basis for choosing the most appropriate actions to correct computer use inequities or if, in fact, the system which promotes and supports computer use is working well, this documentation will be valuable.

The range of issues that school board members must consider includes a wide array of twenty-one issues identified by Rampy, White, and Rockman (1983) can be grouped into five clusters: curriculum issues; courseware concerns; teacher education; acquisition and funding; and administrive uses. Also, there are new areas unique to computer use such as the social implications of computer use and the attendant ethical concern. Clearly, then, board members face a complex area.

It is important for policy makers not to be constrained to either an overly formalized process or frustrated by an intuitive, seemingly uncontrolled, procedure. This paper has attempted to bring into sharper focus those factors which are associated with policy formation and education delivery. Examples of computer policy and definitions for a decision space were presented. An initial tool was recommended for analyzing practice and the linkages between practice and defacto policy. Gaining this perspective and a reasonably comprehensive view of practices is possible. One of the first steps in developing this understanding is to document current use in an organized manner so school board members can proceed with the significant task of setting policy.

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